Modern Sedimentary Mechanisms and Evolution of Extreme Event Layers Offshore Southwestern Taiwan

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Abstract

Taiwan, located in the Pacific typhoon corridor and Ring of Fire, frequently experiences typhoons and earthquakes, making submarine geohazards common. The Gaoping River, Taiwan's second longest, delivers an average of 35.61 million tons of sediment annually, dominating sediment input off southwestern Taiwan. Sedimentation rates offshore are generally below 0.5 cm/year, with the northern upper slope being more stable than the south. Natural disasters, such as Typhoon Haitang in 2005, have significantly impacted sediment distribution, leaving identifiable event layers (e.g., from Haitang and the 1963 global fallout). This study integrates radionuclide data from Huh et al. (2009) with 13 box core samples collected in 2023 to analyze sedimentary events, transport pathways, and geohazard risks. Initial results show porosity increases with depth, while median grain size and sorting decrease. Elevated sand content on the northern shelf is linked to northward coastal currents and canyon head overflow. Future work will explore hydrodynamic variations and bioturbation effects to improve sediment chronology and understanding of depositional dynamics over the past 20 years.

Introduction

The study area is offshore southwestern Taiwan, with 13 sites across the shelf and slope on both sides of the Gaoping Submarine Canyon. This study compares 2023 sediment cores with past data on radionuclides and grain size to assess temporal changes.

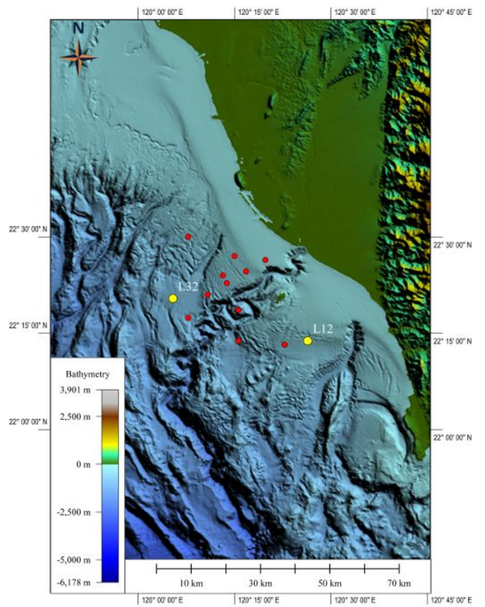


Fig. 1 (Left)
Location of 13 core sites, L12 and L32 are located on the upper continental slope and the lower continental slope, respectively.

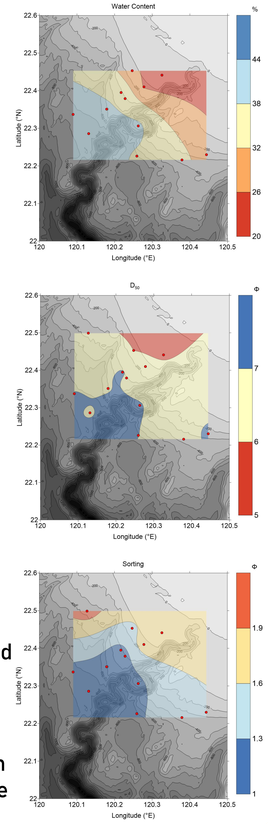
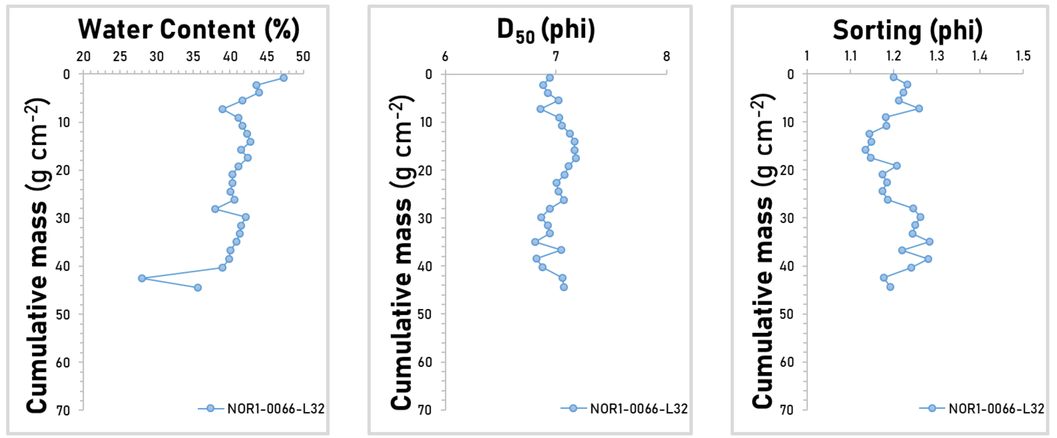


Fig. 2 (Right)
Water content shows a positive correlation with depth, whereas D_{50} and sorting show a negative correlation with depth.

Comparison of Past and Present Radionuclide Analysis Results



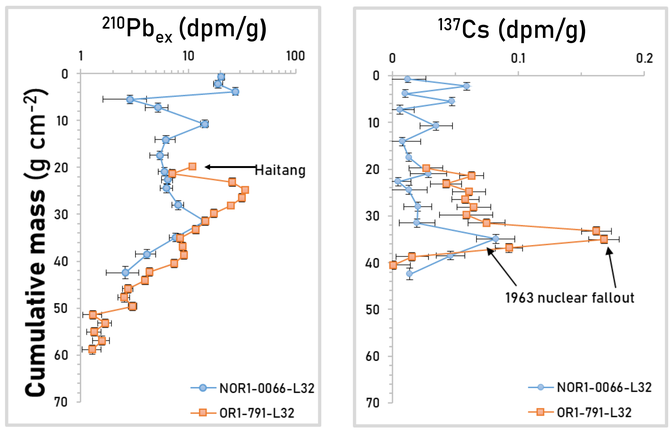


Fig. 3
Compared with previous research results, the core sample collected in 2023 from station L32 also shows the previously identified 1963 nuclear test fallout layer and the 2006 Typhoon Haitang layer in the excess lead-210 and cesium-137 profiles.

Subsampling Strategy Considering Bioturbation

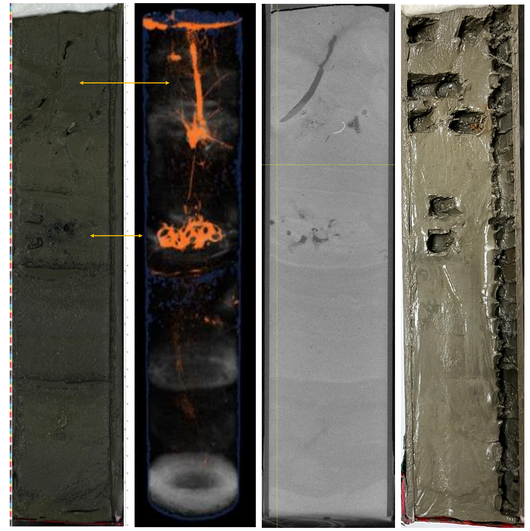


Fig. 4
Core surface photography and CT image, the form of bioturbation structures can be observed. Box-shaped samples were collected from undisturbed sediment layers, while additional box samples were taken from areas showing evidence of bioturbation.

References

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